

NOTES ON NEW SPECIES OF EPILAMPRINE COCKROACHES
FROM COSTA RICA AND PANAMA
(BLATTARIA: BLABERIDAE)

FRANK W. FISK AND COBY SCHAL

(FWF) Department of Entomology, Ohio State University, Columbus, Ohio 43210; (CS) Department of Entomology, University of Kansas, Lawrence, Kansas 66045.

Abstract.—Four new species of *Epilampra* are described, *E. involucris* and *E. belli* from Costa Rica, and *E. unistilata* and *E. rothi* from Costa Rica and Panama. The first three, along with *E. carinulata* (Saussure), are designated as the *Carinulata* Group of *Epilampra*.

Several undescribed species of cockroaches have been encountered in Costa Rica and Panama in recent years. In this paper four new species are described, and some biological notes given in order to facilitate future studies. Roth (1969; 1970a, b; 1973), in a continuing study of the male genitalia of Blattaria, drew significant taxonomic inferences. We follow his methods for dissection and preparation of the genitalia and his system (as derived from McKittrick, 1964) for naming the parts. Roth (1970b) in his study of the genus *Epilampra* Burmeister, 1838, discussed the close affinities of *Audreia* Shelford, 1910, to *Epilampra* and the ambiguities encountered by other specialists (Hebard, 1920; Rehn and Hebard, 1927) resulting from Shelford's characterization of *Audreia*. Consequently, Roth transferred all the *Audreia* species which he examined, except the type-species, *A. carinulata* (Saussure), 1895, into either Subgroup A of his *Burmeisteri* Group or his monotypic *Heusseriana* Group of *Epilampra* or to the genus *Poeciloderrhis* Stål, 1874. Roth based his conclusions chiefly on the morphology of the male genitalia, noting that the primary character used by Shelford, the reduced subquadrate tegmina in both sexes, is not true of all *Audreia*. For example, *A. exploratrix* Gurney has lateral lobate tegmina, while *A. bromeliadarum* Caudell and *A. cicatricosa* (Rehn) are apterous. Three of the species described here share characters of the male genitalia and lack of a left style with *A. carinulata*, yet the nymphal color patterns, where known, are typical of *Epilampra*. We consider them to comprise a new species group within the genus *Epilampra*.

The holotype and allotype of all four species described here are deposited in the Ohio State University Entomology Museum. Paratypes are divided about equally between the Snow Entomological Museum, University of Kansas, and the F. W. Fisk collection.

Carinulata Group, NEW DESIGNATION

Adults usually shining reddish brown; tegmina usually short, subquadrate in both sexes (but may be full length); subgenital plate of male asymmetric, single right style; hooked phallomere, R2, stout, lacks subapical incision, sheath proximal to base of R2 lacks row of slender setae noted for most *Epilampra*; sclerotization of left phallomere, L2d, diagnostic for the group and species within it; nymph tan or gray, numerous dark punctations as typical for *Epilampra*. Appearance of R2 in this group very similar to R2 in *Poeciloderrhis* (as defined by Roth, 1970a), but no *Carinulata* Group species shows abdominal tergal glands as noted for male *Poeciloderrhis*.

KEY TO SPECIES OF THE *CARINULATA* GROUP

1. Adult fully winged in both sexes *unistilata*, new species
- Adult with tiny wing rudiments and short subquadrate tegmina in both sexes 2
2. Smaller, length of male under 14 mm, of female under 18 mm *carinulata* (Saussure)
- Larger, length of male 16–23 mm, of female 22–28 mm 3
3. Male with flattened sclerotization of left phallomere, L2d, L-shaped and blunt-tipped (Fig. 1A); female with lateroposterior angles of abdominal tergum 7 acute; supra-anal plate with very shallow (0.15 mm deep) median notch *involucris*, new species
- Male with flattened sclerotization of left phallomere, L2d, hammer-head-shaped (Fig. 1D); female with lateroposterior angles of abdominal terga 3–7 acute, spinelike; supra-anal plate lacks median notch *belli*, new species

Epilampra involucris Fisk and Schal, NEW SPECIES

Figs. 1A, 1B, 1C

Male holotype.—Measurements in Table 1. Head broad and flat, interocular distance nearly $\frac{1}{2}$ width of head, distance between white ocellar spots $\frac{1}{3}$ width of head; maxillary palpus pale, distal (5th) segment covered with gray microtrichiae giving it a velvety appearance; segment 5 longer than 4, slightly shorter than 3; mouthparts lighter colored than reddish brown of head and body; antenna brown, shorter than body. Pronotum convex, semi-circular in outline, lateroposterior angles rounded, right and left posterior margins straight, meeting at obtuse (160°) angle; pronotum covering most

of head; tegmina truncated, $1\frac{1}{3}\times$ as long as pronotum, their lateroposterior angles broadly rounded, posterior margins nearly straight, exposing 7 abdominal terga but covering tiny wing rudiments; tegmina smooth, venation feebly indicated by lines of shallow punctations between scarcely elevated veins.

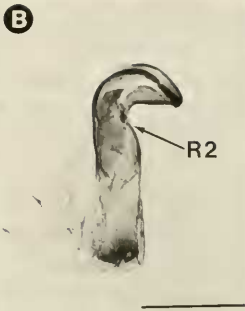
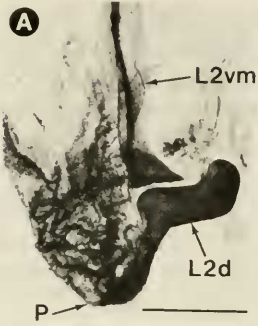
Abdominal terga, except tergum 7, bear acute spines at lateroposterior angles, smooth except for up to 18 low longitudinal ridges (cicatrices) on distal $\frac{1}{4}$ th of each tergum; tergal glands or specializations not evident; supra-anal plate extends beyond subgenital plate, broadly rounded posteriorly with shallow (0.2 mm deep) median notch; plate reddish brown proximally, distal $\frac{1}{2}$ nearly transparent with scattered small raised black spots, each surrounded by a setal socket; cercus light brown, flattened, stout, apparently 10-segmented; terminal segment finger-shaped, black-tipped. Genitalia (Figs. 1A, B, C) similar to those of *carinulata* (Roth, 1970b, figs. 347–352); hooked right phallomere (R2) small, stout, blunt-tipped except for minute distal spine; subapical incision lacking. R2 of holotype has apparent split on outer circumference of hook, but split lacking in dissected paratypes. Flat sclerotization of left phallomere (L2d) blunt-tipped and L-shaped as in *carinulata*, but membranous prepuce readily visible due to thick covering of microtrichiae; phallomere L1 with deep, well defined cleft, setal brush lacking.

Abdominal sterna smooth, transverse except posterior margin of sternum 7 with sharp lateral emarginations at base of each cercus, the remainder broadly concave; subgenital plate with anterior margin broadly convex, posterior margin convex laterally, broadly emarginate centrally with simple (0.5 mm) right style, left style absent. Legs and ventral body surface brown, less reddish than dorsal surface; ventro-anterior margin of front femur with 4 large spines separated by row of minute setae from 2 apical spines; ventro-anterior margins of mid- and hindfemora with 4 spines plus apical spine, of hindfemur with 4 spines only; mid- and hindfemora with dorso-apical (genicular) spine. Tibiae fully spined; tarsi with obvious pulvilli on 4 proximal tarsomeres, large arolium and simple symmetrical claws on 5th tarsomere.

Female allotype.—External form and color similar to those of male except as follows: Tegmina with posterior margins broadly rounded, merging imperceptibly with lateroposterior angles; tergum 7 with lateroposterior an-

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Fig. 1. Male genitalia of *Epilampra* spp. A, B, C, *E. involucri*. D, E, F, *E. belli*. G, H, I, *E. unistilata*. J, K, L, *E. rothi*. A, D, G, J, Ventromedial sclerite of left phallomere (L2vm), dorsal sclerite of L2 (L2d), prepuce (P). B, E, H, K, Hooked sclerite of right phallomere (R2), subapical incision (SI). C, F, I, L, First sclerite of left phallomere (L1), cleft (C). Scale bars = 0.5 mm. Fig. J from Roth (1970b, fig. 281).



gles acute; supra-anal plate uniform reddish brown, lacking color pattern noted for type, plate more transverse, not extending beyond subgenital plate; median notch shallow (0.15 mm deep). Subgenital plate fused with sternum 7 (as in all female blaberid cockroaches), its anterior margin slightly convex, posterior margin semicircular with sinuate outline. Genitalia not studied.

Male nymph (subimago).—Head broad, interocular distance nearly $\frac{1}{2}$ head width, interocellar distance $0.35 \times$ head width; front of head brown with scattered dark punctations, mouthparts lighter colored, maxillary palpus as in adult. Antenna brown; pronotum convex, semicircular in outline, posterior margin transverse, lateroposterior angles broadly rounded and extending posteriorly; meso- and metanota exposed; transverse wing pads seen as broadly rounded lateroposterior angles; color of entire notum light gray, heavily marked with black punctations and dark brown spots, spots concentrated centrally along posterior margins of terga. Abdominal terga bear acute spines at lateroposterior angles and raised cicatrices as described for adult; each cicatrix marked by dark brown spot; other spots on terga apparently formed by clusters of scattered dark punctations. Overall coloration shows "salt and pepper" effect characteristic of *Epilampra*. Supra-anal plate semicircular with broadly rounded lateroposterior margins reflexed and median notch at posterior end; coloration gray with numerous punctations; tan, black-tipped cerci stout, weakly segmented. Abdominal sterna light brown with dark punctations; subgenital plate with right style present, left absent (earlier instars have symmetrical paired styles).

Types.—Holotype δ , allotype ♀ , 6 δ and 3 ♀ paratypes and 2 δ nymphs all from COSTA RICA, Heredia Prov., Finca La Selva near Puerto Viejo, collected by C. Schal during 1979 and 1980; other male and female paratypes from same locality collected by F. W. Fisk in March 1974.

Remarks.—*Epilampra involucris* may be separated from other species in the *Carinulata* Group by means of the key. Based on external morphology alone it is difficult to separate from *E. belli*, but the male genitalia are distinct. Also, based on present knowledge, the species are allopatric; *involucris* is found in the Caribbean lowlands of north central Costa Rica while *belli* occurs in the Pacific highlands in southern Costa Rica near the Panama border. *Epilampra involucris* is commonly found in both primary and secondary (older than 20 years) forests in the Caribbean lowlands. The males rest in leaf litter by day but climb onto vegetation at dusk, rarely climbing higher than 50 cm above the ground. Females and nymphs are found in the leaf litter, though occasionally late instar nymphs and females climb as well. The courtship sequence is somewhat similar to that of *Gromphadorhina portentosa* (Schaum) (Barth, 1968). Following contact with a female the male arches his abdomen down and then up in a sweeping motion until he contacts the female's genitalia. The more common sequence noted

Table 1. Measurements of adult *Epilampra involucris* in mm.

	Holotype ♂	6 Paratype ♂ (Range)	Allotype ♀	3 Paratype ♀ (Range)
Total length	19.0	16.6–22.6	25.6	25.4–28.2
Pronotum, length	5.3	5.0–5.5	7.0	5.5–6.9
Pronotum, width	7.5	7.7–8.5	10.2	9.1–10.2
Tegmen, length	6.3	5.9–6.9	7.9	5.9–9.0
Tegmina, width	9.0	8.7–10.2	12.2	10.9–12.4
Abdomen, length	11.9	11.8–14.0	14.5	12.4–14.6
Hindtibia, length	7.2	6.6–8.5	9.2	8.3–9.8

in Blattaria, namely, mounting of the male by the female, does not occur in this species. Copulation takes place in the usual opposed position and lasts 20 to 30 minutes. As in other blaberid cockroaches the oothecae are not deposited externally but are held in the genital pouch until the young are hatched. Dissection of six oothecae disclosed 50 ± 2.53 (mean \pm standard deviation) developing embryos in each.

The name *involucris* refers to the flightless condition which this species shares with most members of the *Carinulata* Group.

Epilampra belli Fisk and Schal, NEW SPECIES

Figs. 1D, 1E, 1F

Male holotype.—Measurements in Table 2. Head broad and flat; interocular distance just over $\frac{1}{2}$ head width, interocellar distance $\frac{1}{3}$ head width; dark reddish brown color of body and head extends to clypeus; clypeus and mouthparts buff; expanded distal segment of clypeus velvety gray; antenna brown. Pronotum and tegmina as in *involucris*; both species show suffused sprinkling of darker spots around margins of pronotum and tegmina comparable to black punctations of other *Epilampra*. Lateroposterior angles of abdominal terga 2–4 about 90° , of terga 5 and 6 acute, spinelike, of tergum 7 rounded. Terga smooth except for cicatrices along distal margins; tergal specializations absent. Supra-anal plate extends beyond subgenital plate, broadly rounded posteriorly with very shallow notch; exposed portion of plate mostly transparent with scattered setae; cercus light brown, apical segment slender, black-tipped. Abdominal sterna and subgenital plate as in *involucris* (right style present, left absent). Genitalia (Figs. 1D, E, F) similar to those of *involucris* except as follows: R2 lacks any split on its outer circumference, L1 more sclerotized, L2d with free sclerotized portion shaped like hammerhead, proximal extension truncate, apical extension blunt-tipped; additionally, a sclerotized portion extends into membranous prepuce; prepuce nearly transparent, lacking microtrichiae. Legs differ from

Table 2. Measurements of *Epilampra belli* in mm.

	Holotype ♂	2 Paratype ♂ (Range)	Allotype ♀	3 Paratype ♀ (Range)
Total length	1	18.6–19.0	22.2	22.4–26.5
Pronotum, length	5.2	5.1–5.8	6.0	6.3–8.0
Pronotum, width	7.2	7.1–7.3	8.4	9.1–10.0
Tegmen, length	6.3	5.9–6.1	7.7	7.9–9.8
Tegmina, width	8.8	8.9–9.1	10.9	10.9–12.4
Abdomen, length	1	9.5–10.1	15.8	14.5–17.1
Hindtibia, length	6.5	6.6–6.8	8.2	7.5–9.5

¹ Tip of abdomen removed for dissection of genitalia.

those of *involutris* only in 3 (rather than 4) large spines on ventroposterior margin of hindfemur and smaller tarsal arolia.

Female allotype.—External features similar to holotype except as noted: Posterior margins of tegmina broadly rounded, merging with lateroposterior angles; abdominal terga 3–7 with lateroposterior angles acute, spinelike; supra-anal plate uniform dark reddish brown, posterior margin without median notch; subgenital plate with anterior margin slightly convex, posterior margin semicircular.

Types.—Holotype ♂ and allotype ♀ from COSTA RICA, Puntarenas Prov., Finca Las Cruces near San Vito, collected by W. J. Bell Jan. 27, 1980; 1 ♂ paratype collected by M. Kosztarab Feb. 12, 1970 at same locality; 1 ♂, 3 ♀ paratypes collected by F. W. Fisk Feb. 4–6, 1974 from same locality.

Remarks.—*Epilampra belli* is closest to *E. involutris* but can be separated from it as noted in the key and remarks under *involutris*. Very little is known of its biology except that it favors very moist habitats. The species is named after Dr. William J. Bell who collected the type specimens.

Epilampra unistilata Fisk and Schal, NEW SPECIES

Figs. 1G, 1H, II, 2B

Male holotype.—Measurements in Table 3. Head flat; interocular and interocellar distances nearly equal, about $\frac{1}{4}$ head width; vertex tan; nearly black interocellar band present; face and mouthparts mostly buff; maxillary palpus with 5th (distal) segment covered with gray microtrichiae, segments 3 and 4 subequal in length, shorter than 5; antenna brown; pronotum exposing vertex of head and dorsal areas of compound eyes; pronotum vaulted, anterior and lateral margins forming a semicircle; lateroposterior angles broadly rounded, right and left posterior margins straight, meeting at 120° angle; base color mottled red brown, interrupted by poorly defined pale median line. Tegmina fully developed, extending beyond tips of cerci; dis-

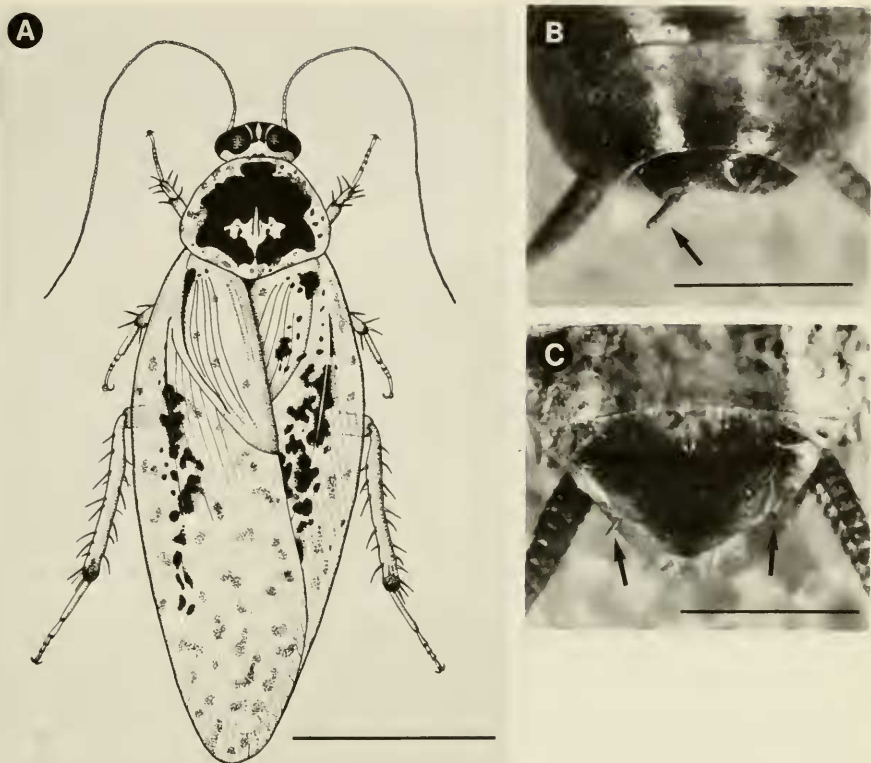


Fig. 2. A, Male *Epilampra rothi*, habitus of dark form: scale bar = 6.2 mm. B, C, Ventral aspect of distal part of abdomen. B, *E. unistilata*. C, *E. rothi*. Scale bars for B and C = 2.0 mm.

coidal sectors (M + Cu veins) oblique; wings and tegmina transparent, tinted with reddish brown, but tegmina also with darker brown mottling. Light brown abdominal terga have lateroposterior angles broadly rounded, cicatrices barely visible, tergal specializations lacking; supra-anal plate semicircular, rounded posterior margin with oblique median emargination; cercus slender, nearly 7× longer than wide.

Genitalia (Figs. 1G, H, I) characteristic for Group; R2 small and stout with blunt tip, no subapical incision or slender setae on sheath; L1 with a deep open cleft; L2d with flattened sclerotized portion ovate distally, proximal portion (adjacent to L2vm) with deep U-shaped emargination. Subgenital plate (Fig. 2B) convex anteriorly and posteriorly, posterior margin with ample median emargination, single style arising from right edge of emargination. Abdominal sterna light reddish brown with scattered darker tiny

Table 3. Measurements of *Epilampra unistilata* in mm.

	Holotype ♂	8 Paratype ♂ (Range)	Allotype ♀	3 Paratype ♀ (Range)
Total length	20.2	20.8–22.4	23.0	24.4–24.8
Pronotum, length	4.0	4.0–4.3	4.4	4.8–5.0
Pronotum, width	4.9	5.1–5.6	6.6	6.7–7.2
Tegmen, length	16.7	17.7–19.7	19.4	20.0–20.8
Tegmina, width	9.1	9.1–10.5	10.5	9.3–10.3
Abdomen, length	9.3	9.1–10.4	10.7	—
Hindtibia, length	6.7	6.5–6.8	7.3	7.4–7.7

spots, no spots on legs and ventral thorax; ventro-anterior margin of front femur with 3 large spines separated by row of widely spaced minute setae from 2 apical spines; ventro-anterior margins of mid- and hindfemora also ventroposterior margins of front and midfemora all with 3 large spines plus apical spine, ventroposterior margin of hindfemur as above but lacks apical spine; in addition, mid- and hindfemora bear genicular spine. Tibiae fully spined; tarsi with obvious pulvilli on 4 proximal tarsomeres; arolium present; claws simple, symmetrical.

Female allotype.—Similar to male in external form and color except as follows: Interocellar band not so dark; supra-anal plate with large posterior median emargination; cerci less slender, about 4× longer than wide; subgenital plate with posterior semicircular margin entire; ventro-anterior margin of front femur with 4 large spines (rather than 3); ventroposterior margin of hindfemur with 4 spines plus genicular spine.

Types.—Holotype and allotype collected in copulo by C. Schal May 4, 1979 in COSTA RICA, Heredia Prov., Finca La Selva near Puerto Viejo; 5 ♂ and 3 ♀ paratypes collected by C. Schal in 1979, same locality; 3 ♂ paratypes collected in light traps by H. Wolda July 10 and Oct. 13, 1977 in PANAMA, Chiriqui Prov., Fortuna; 5 ♂ paratypes collected in light traps by H. Wolda Feb. 17 and May 10, 1980 in PANAMA, Bocas del Toro Prov., Corriente Grande, on Rio Changuinola.

Remarks.—*Epilampra unistilata* is the only member of the *Carinulata* Group to have fully developed, functional wings and tegmina. It is placed in the group because of the single right style (from which the name is derived; Latin *Stilus*) and the morphology of the male genitalia which are most similar to those of *carinulata*.

Variations among the paratypes are noted in the intensity of coloration and the spination of the legs, that is, the ventro-anterior margin of the front femur has 4 (sometimes 3) spines separated by a row of fine setae from the 2 (sometimes 1) apical spines; the ventroposterior margin of the midfemur usually has 4 plus a distal spine; and the hindfemur usually has 4 large spines but no distal spine.

Epilampra unistilata occurs in the lower understory of lowland rain forests. Males are active starting around sunset. They usually climb to from 0.5 to 1.5 m above ground level. As noted above, they have been taken in light traps. Females are rarely seen and usually occur lower in the vegetation. Courtship was not observed, but copulation is in the typical opposed position. The ootheca of one female was found to contain 36 developing embryos.

Epilampra rothi Fisk and Schal, NEW SPECIES

Figs. 1J, 1K, 1L, 2A, 2C

Male holotype (light form).—Measurements in Table 4. Head flat, with interocular and interocellar distances equal, $\frac{1}{4}$ as wide as head; vertex pale cinnamon, interocular space suffused with dark brown, darkest adjacent to inner margins of eyes and ocellar spots; central brown mark just below ocelli and separated from interocular band by pale tan area, the mark connected dorsolaterally with pair of commalike spots, their "heads" directly beneath but not touching ocelli; pair of median brown spots on clypeus below central mark; remainder of head pale except gray-brown segments 4 and 5 of maxillary palpus; antenna brown. Vaulted pronotum covering most of head; ground color of pronotum and tegmina cinnamon, disc with diffuse pattern of darker areas; wide borders of pronotum and costal margins of tegmina pale with scattered darker spots; tegmina and wings translucent. Abdominal terga tan, lateroposterior angles rounded, no cicatrices or tergal specializations; supra-anal plate semicircular with median emargination not evident in holotype (but present in some paratypes); cercus slender, about 5× longer than wide; genitalia as in Figs. 1J, K, L; R2 with obvious subapical incision and row of slender spines proximal to base; L1 with short open cleft, setal brush lacking but a few widely scattered microtrichiae at that site; L2d shaped like mitten with thumb extended at near right angle; prepuce clearly defined by its scalelike covering. Legs and ventral surfaces of thorax and abdomen tan with a few darker spots, abdominal sterna increasingly darker towards posterior; reddish brown subgenital plate (Fig. 2C) convex anteriorly, trigonal posteriorly with nearly straight lateroposterior margins meeting at midline as a blunted right angle, simple style located at center of each lateroposterior margin; right style somewhat larger. Vento-anterior margin of front femur with 5 large spines separated by row of close-set, short setae from 2 apical spines; ventro-anterior margins of mid- and hindfemora with 3 large spines plus apical spine; ventroposterior margin of front femur with 2 spines plus apical spine, of midfemur with 4 spines plus apical spine, of hindfemur with 4 spines only; tibiae fully spined; tarsi with pulvilli on 4 proximal tarsomeres and arolium on 5th tarsomere between simple, symmetrical claws.

Male paratype (dark form).—Differs from holotype in color as follows

Table 4. Measurements of *Epilampra rothi* in mm.

	Light Form (Costa Rica)				Dark Form (Panama)	
	Holotype Male	8 Paratype ♂ (Range)	Allotype Female	5 Paratype ♀ (Range)	24 Paratype ♂ (Range)	3 Paratype ♀ (Range)
Total length	20.0	19.4-20.2	20.8	19.4-22.3	18.2-20.6	20.7-21.3
Pronotum, length	4.2	3.7-4.1	4.3	4.1-4.7	3.9-4.4	3.7-4.7
Pronotum, width	5.1	4.7-5.7	5.7	5.4-6.6	4.7-5.0	5.0-5.9
Tegmen, length	16.8	16.6-17.3	17.0	16.0-19.4	16.0-18.3	16.1-17.9
Tegmina, width	8.2	7.5-9.4	9.0	8.4-9.9	7.7-9.3	9.1-10.0
Abdomen, length	10.8	10.4-11.0	11.1	11.5-13.8	10.3-11.1	9.9-12.4
Hindtibia, length	6.3	5.4-6.5	6.0	6.0-6.6	5.1-6.4	5.2-6.6

(Fig. 2A): Ground color of whole body buff, contrasting with numerous dark brown markings; vertex of head pale with dark stripes just dorsal and ventral to it, the 2 ventral stripes filling most of the interocular plus interocellar space (stripes fused on the midline in some paratypes); below stripes, but separate, is central dark mark with its dorsolateral commalike extensions; this mark fused with clypeal spots noted in holotype, resulting in very dark central mark with well defined margins which, along with small lateral spots and black mandibles, comprises characteristic facial pattern; maxillary palpus with light and dark bands on all segments. Dark disc of pronotum contrasts sharply with pale but spotted borders; very dark marks irregular (but consistent) in shape; obvious central pale area within disc enclosing 2 pairs of small black dots; tegmina with numerous dark brown spots, some fused into mottled dark areas especially along radial vein; venter of thorax and abdomen plus legs marked with numerous nearly black spots; some larger marks on coxae and femora and dark bands on tibiae and tarsi; subgenital plate and 2 adjacent sterna reddish brown except for narrow pale latero-posterior borders.

Female allotype (light form).—Similar to male holotype except as follows: General coloration more intense, dark markings on face as in dark form except the 2 clypeal spots not fused with central face mark; disc of pronotum and most of tegmina cinnamon, but wide borders of pronotum and costal margins of tegmina pale with numerous dark spots; abdominal terga shading to dark reddish brown towards supra-anal plate; plate dark with narrow pale borders and short median stripe extending anteriorly from posterior margin about $\frac{1}{4}$ length of plate; posterior margin with oblique median emargination; legs and venter of thorax and abdomen colored as in dark form males; subgenital plate semicircular in outline.

Female paratypes.—Other Costa Rican females less intensively colored than allotype, correspond more to cinnamon colored light-form males, while Panamanian females correspond to dark form males; that is, they have 2

clypeal spots fused with central facial mark, dark pronotal disc with central pale area and no cinnamon color on dorsum.

Types.—Holotype and allotype taken in copulo by C. Schal Feb. 23, 1980, COSTA RICA, Heredia Prov., Finca La Selva near Puerto Viejo; 6 ♂ and 3 ♀ paratypes collected by C. Schal in 1979 and 1980, same location; 2 ♀ paratypes collected by M. Kosztarab and A. Young in light trap, Jan. 10, 1970, same location; 2 ♂ and 2 ♀ paratypes taken by H. Wolda in light traps, May 1978, May and June 1979, PANAMA, Chiriqui Prov., Fortuna; 24 ♂ and 3 ♀ paratypes taken by H. Wolda in light trap between Jan. 13 and May 10, 1980, PANAMA, Bocas del Toro Prov., Corriente Grande on Rio Changuinola.

Remarks.—*Epilampra rothi* appears to represent the "n. sp. D" of Dr. Louis M. Roth (1970b) for whom we have named the species. As pointed out by Roth it is closest to but distinct from *Epilampra azteca* Saussure and falls in Subgroup C of the *Burmeisteri* Group of *Epilampra*. It exhibits considerable range in coloration. The dark form (from Panama) with striking dark markings against a pale background (Fig. 2A) most closely resembles *azteca* and has been mistakenly identified as *azteca* in the past (Roth, 1970b), while the light form (from Costa Rica and the adjacent Chiriqui Province of Panama) with suffused chestnut brown markings on a cinnamon brown background appears quite different. Both populations agree in external morphology and male genitalia, and we are treating them as one species. As noted in the descriptions some individuals show color patterns between the dark and light extremes.

Epilampra rothi is probably the most common species of its size in the lower understory of the Costa Rican lowland rain forest, but it is apparently more restricted in its Panamanian distribution. Males are common on leaves starting about sunset usually 0.5 to 1.5 m above ground. Females are relatively scarce and occur lower in the vegetation, while nymphs are common in the leaf litter. Copulation is in the opposed position. Courtship was not observed. C. Schal collected 3 males of this species in north central Nicaragua along the Rio Bocay.

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LITERATURE CITED

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